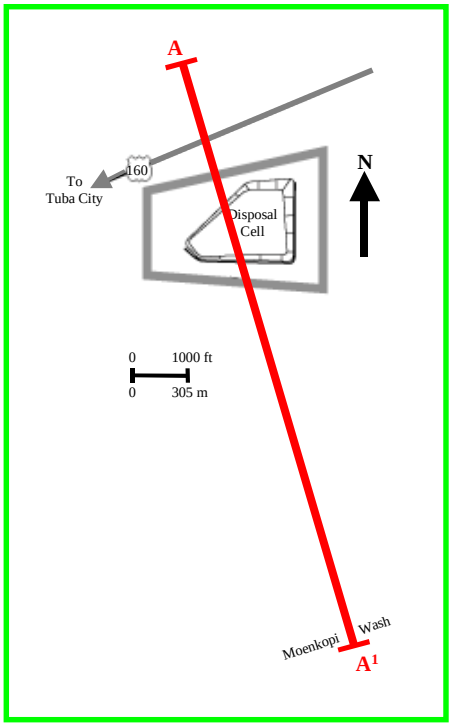
Vadose Zone Fact Sheet
Tuba City

Background: The 42 hectare (105 acre) Tuba City site (TCS) is located 9 km (5.5 mi) east of Tuba City in Coconino County, Arizona and 137 km (85 mi) north of Flagstaff on tribal land. The mission of the TCS was to provide uranium for the United States Government. The source of contamination was the residual tailings remaining after the uranium was extracted during the milling process.

Issues: TCS is on Navajo Nation lands; however, the Hopi Tribe has filed an appeal over this jurisdiction.



Vadose zone infiltration: With completion of the disposal cell, there is minimal vadose zone infiltration across the site.

Vadose zone characterization/remediation: The tailings, windblown and waterborne deposits, demolished mill building, and other contaminated materials were stabilized on the site in a 20-hectacre (50-acre) disposal cell. Surface remediation was completed in May 1990. The long-term surveillance of the disposal cell will remain the responsibility of the Federal Government through a Custodial Access Agreement among the Navajo Nation, Hopi Tribe, and the Department of Energy. Provisions of the Custodial Access Agreement will include restriction of public access and posting of appropriate warning signs. Future use of the area beyond the disposal site boundary will likely be agricultural.

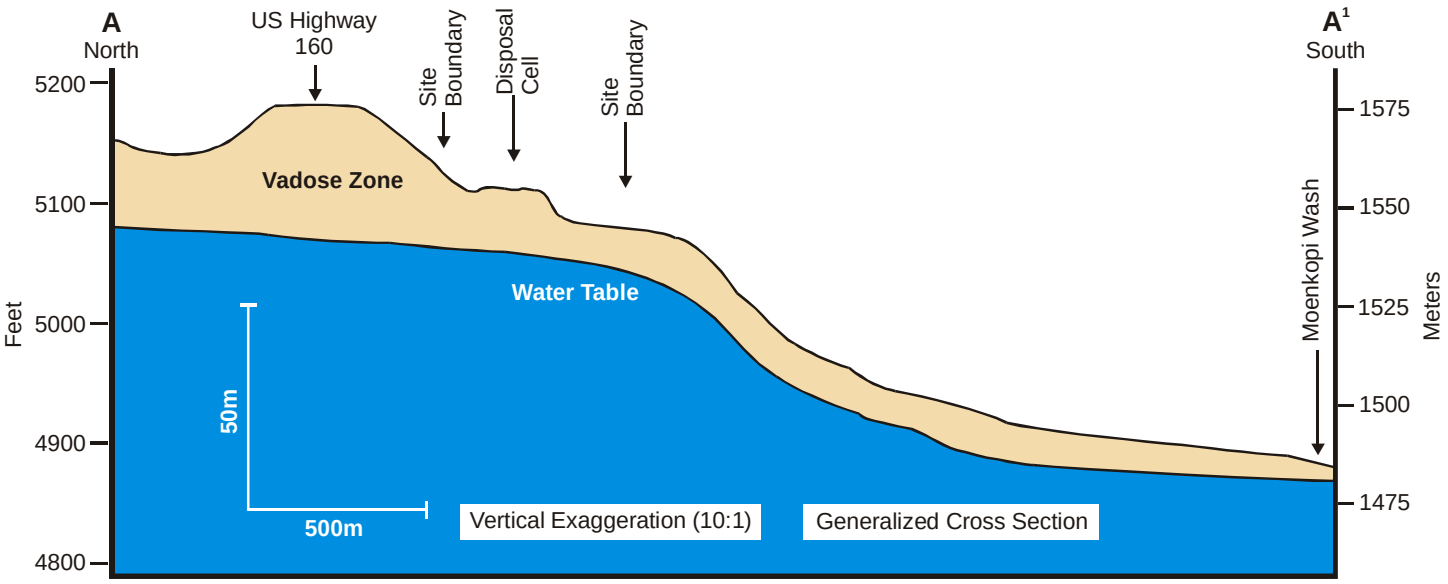
Precipitation: The site is arid, with an average annual precipitation of 15 cm (6 in).

Surface Waters: The site is approximately 2100 m (7000 ft) northwest of Moenkopi Wash, an intermittent stream that joins the Little Colorado River to the southwest. No other watercourses exist in the vicinity of the site. A natural spring and seeps appear along the base of an escarpment, approximately 1800 m (6000 ft) east-southeast of the site. Surface water and sediment samples do not show any signs of contamination.

Geology: TCS is located on the Kaibito Plateau, a gently slopping terrain ranging in elevation from 1545 to 1554 m (5070 to 5100 ft) above sea level. Elevations increase steadily to the north and decrease abruptly to the east and southeast. The area is covered by up to 7 m (22 ft) of dune sand, pediment gravel, and clay. These deposits overlie several hundred meters of the Navajo Sandstone and Kayenta Formations.

Vadose zone thickness: The vadose zone ranges from 6 to 50 m (20 to 150 ft) thick.

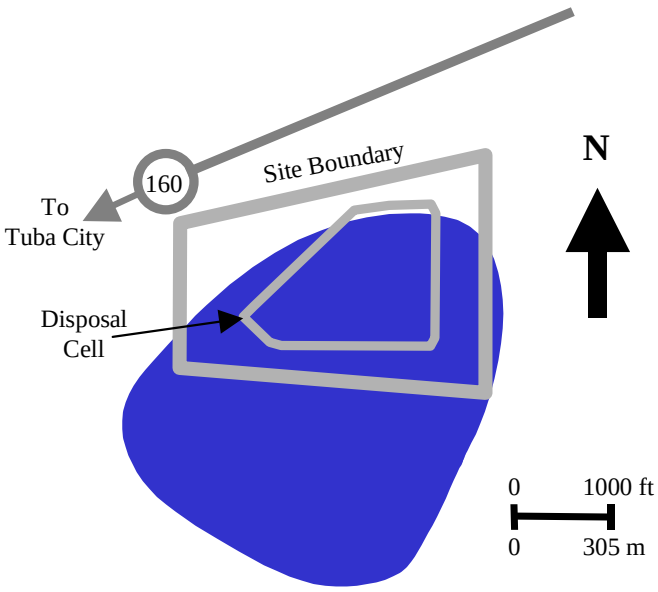
Major contaminants of concern: Molybdenum, nitrate, selenium, sulfates, uranium, and net gross alpha and radium-226 and –228.



Ground Water Fact Sheet
Tuba City

Background: The 42 hectare (105 acre) Tuba City site (TCS) is located 9 km (5.5 mi) east of Tuba City in Coconino County, Arizona and 137 km (85 mi) north of Flagstaff on tribal land. The mission of the TCS was to provide uranium for the United States Government. The source of contamination was the residual tailings remaining after the uranium was extracted during the milling process.

Hydrogeology: The uppermost aquifer at the site is in the Navajo Sandstone. This formation is up to 130 m (430 ft) thick in the area. Ground water in this aquifer flows southeast toward Moenkopi Wash at an estimated average velocity of 0.6 to 30 m (2 to 100 ft) per year. The plume of contamination extends approximately 460 m (1500 ft) down gradient from the site.



Nitrate Plume in Ground Water

Issues: It is projected that the Nuclear Regulatory Commission will certify the site to be in compliance with Subpart B of the Environmental Protection Agency Standards by 2011.

Ground water characterization/remediation: Residual milling-related contaminated ground water remains. Ground water contamination has exceeded the maximum concentration limits for levels of molybdenum, nitrate, selenium, uranium, and net gross alpha and radium-226 and -228. The ground-water remediation strategy involves extracting the contaminated ground water through pumping wells, distillation to remove contaminants, and re-injection of clean water to enhance contaminant removal from the subsurface. Ground water sampling demonstrates that ground-water quality conditions immediately down gradient of the disposal cell have a significant increase in chloride, sulfate, total dissolved solids, and uranium concentrations. The release of tailings pore fluids (transient drainage) into the aquifer caused this trend. Continued transient drainage of contaminated water from the disposal cell is expected to last for the next several years. The contamination poses no imminent threat to public health since the ground water is not used for domestic, agricultural or industrial purposes.

Ground water use: Ground water is not withdrawn from the plume area.

Contaminants	Depth	Remedial Approach
Uranium; nitrate; sulfate	213 m (700 ft)	Pump and treat; reinjection